



Energy-Related Environmental Research



PIER Environmental Area (PIER-EA) 2005 Environmental Exploratory Grant Program (EEGP)

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**EEGP Workshops
March/April 2005**

2005 PIER-EA EEGP: Overview

- California Energy Commission (Commission) PIER-EA Program
- Administered through the University of California - California Institute for Energy and Environment (CIEE)
- Funding: approximately \$750,000 total (\$75,000 max./award)
- Program announced: March 1, 2005
- Deadline for receipt of proposals: June 1, 2005



2005 PIER-EA EEGP: Goal and Objective

■ Goal:

- Support the early development of promising, new scientific concepts that have the potential to impact the way we understand and/or address energy-related environmental issues

■ Objective:

- Fund projects that will provide foundational information necessary for more focused, larger scale RD&D projects that support the PIER-EA mission



2005 PIER-EA EEGP: Information

■ Exploratory Projects will provide information that:

- Supports the early development of promising, new scientific concepts
- Can be used to determine the need for new PIER-EA planning efforts (roadmaps)
- Leads to an improved understanding of key processes that affect environmental quality as a result of electricity generation, transmission, distribution and use in California
- Is necessary for more informed decision and policy making in California



2005 PIER-EA EEGP: Participation

■ Participation is open to the following groups:

- Individuals
 - » Except applicants from colleges and universities or affiliated laboratories
- Small and large businesses
- Non-profit organizations
 - » Possesses IRS tax exemption
- Academic institutions
 - » Public or private
- Local, state and federal governmental organizations
 - » Includes national laboratories



2005 PIER-EA EEGP: Requirements

- Matching funds are not required
- Cost sharing is encouraged
- One proposal per principal investigator
- One project per proposal
- Project duration: 12 months max.
- Royalty payments or grant repayments are not required



2005 PIER-EA EEGP: Eligible Activities

■ Examples of eligible research activities:

- Improved analytical methods, models
- Small-scale field research (not technology demonstrations)
- Collection and analysis of existing and new data
- Literature reviews
- Surveys or interviews with experts
- Market assessments/surveys
- Meta-analysis studies



2005 PIER-EA EEGP: Ineligible Projects

- Development of environmental emissions control technologies (note: environmental emissions controls are funded in other areas of the PIER program)
- Design of educational curricula, the training of teachers, or other traditional educational activities
- Environmental impact assessments - as preparation of information required by environmental permit, such as the California Environmental Quality Act or the National Environmental Protection Act
- Environmental mitigation and data collection and analysis as required by local, State, or federal governmental permit

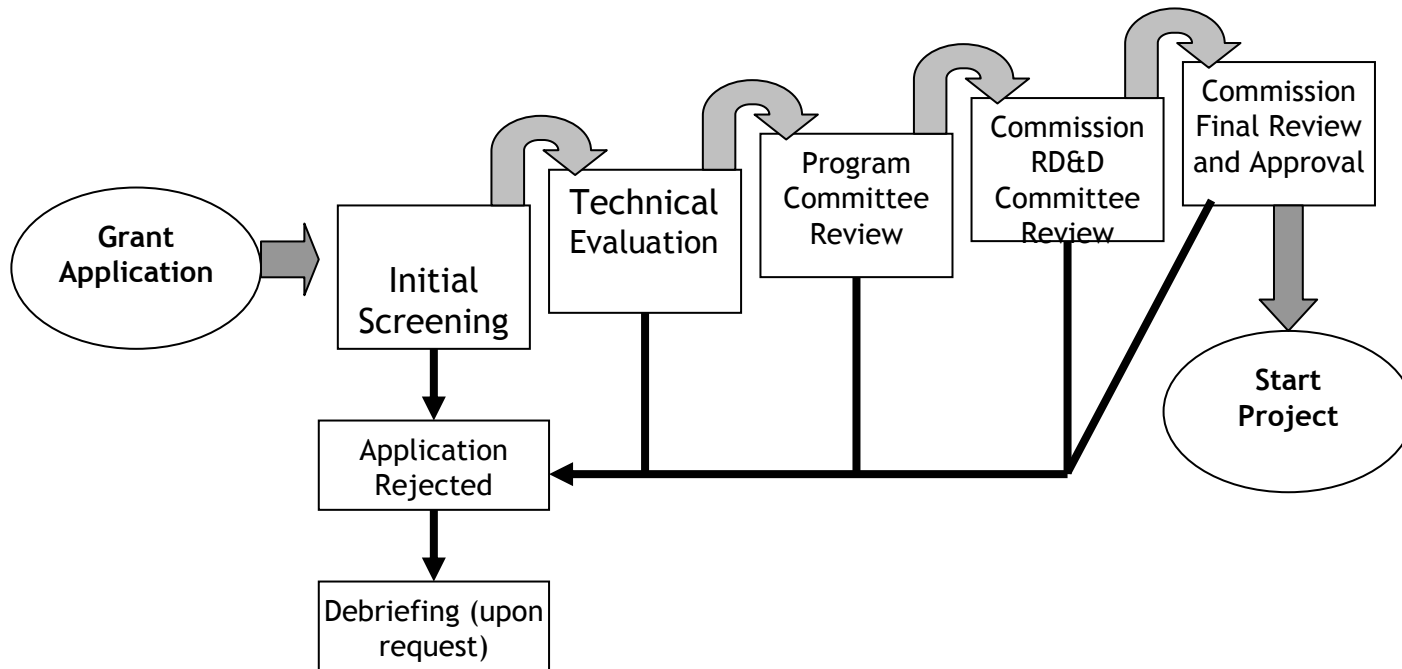


2005 PIER-EA EEGP: Ineligible Projects cont.

- Transportation-related research
- Nuclear energy research
- Technology feasibility studies, development, and/or commercialization
- Marketing and promotion activities
- Product commercialization or certifications
- ** Duplicative research or projects listed in Research Restrictions (see Attachment C-1 in Grant Application Manual) **



2005 PIER- EA EEGP: Grant Project Solicitation Process



2005 PIER-EA EEGP: Initial Screening Criteria

- Proposal was received on time
- Proposal is not marketed proprietary in its entirety
- Proposal is submitted by an eligible applicant
- Application does not contain more than one proposal
- Proposal does not contain more than one project
- Proposal is not greater than \$75,000
- Proposed research clearly fits within PIER-EA
- Proposed research does not duplicate research
- Proposal does not propose “ineligible research”
- Proposal is complete
- Resubmitted proposals adequately address deficiencies noted in prior evaluation



2005 PIER-EA EEGP: Initial Screening Process

- **All criteria must be met**
 - If met, proposal goes to Technical Review
 - If proposal fails any of the criteria, proposal is rejected



2005 PIER-EA EEGP: Technical Review Process

- **Proposals are scored by a minimum of three technical reviewers with recognized expertise in the proposed subject area**
- **Scores: 0-10; scores are weighted**
- **Maximum points: 100**
- **Averaged scores are used to establish preliminary ranked-order list of proposals**
- **Proposals with an averaged score of 60, up to the top 15 proposals (maximum), go to the EEGP Programmatic Committee for review**



2005 PIER-EA EEGP: Technical Evaluation Criteria

- Accurately and completely identifies an important California environmental issue related to the generation, distribution and use of electricity?
- Identifies barriers, issues & knowledge gaps?
- Identifies clear and measurable objectives?
- Proposed work and budget are appropriate and reasonable?
- Well qualified to conduct the project?
- Is likely to succeed?
- Overall technical merit



2005 PIER-EA EEGP: Programmatic Committee

- Composed of individuals experienced in policy and programmatic activities related to PIER-EA
- Members include, at a minimum, PIER-EA EEGP Administrator and Commission staff
- Will help ensure that the proposals recommended for funding are in alignment with PIER-EA and enhance the current portfolio of projects



2005 PIER-EA EEGP: Programmatic Committee's Review Process

- Re-evaluate proposals using Initial Screening Criteria
- Use Programmatic Committee's Review Criteria for scoring proposals
- Scores: 0-10; scores are weighted
- Maximum points: 100
- Averaged scores are used to establish final recommended ranked-order list of proposals
- Funding recommendations made based on available funding and natural breaks in scoring



2005 PIER-EA EEGP: Programmatic Committee's Review Criteria

- Accurately and completely identifies an important California environmental issue related to the generation, distribution and use of electricity?
- Identifies barriers, issues & knowledge gaps?
- Identifies clear and measurable objectives?
- Proposed work and budget are appropriate and reasonable?
- Well qualified to conduct the project?
- Is likely to succeed?
- Overall merit



2005 PIER-EA EEGP: RD&D Committee

- EEGP Manager discusses the proposal selection process, the final rank-ordered list, and the funding recommendations from the Programmatic Committee with the Research, Development & Demonstration (RD&D) Committee
- The RD&D Committee may make a funding recommendation to the full Commission based on these recommendations and on other Energy Commission program considerations



2005 PIER-EA EEGP: RD&D Committee Disapprovals

- The proposal is counter to the development and implementation of a robust public interest RD&D portfolio of projects that address California's energy needs by focussing on the RD&D plans covering the PIER subject areas.
- The proposal is counter to the objective of balancing risks, timeframes and public benefits in a manner consistent with California's energy policies.
- The proposal is counter to the objective of creating a public interest RD&D knowledge base and disseminating information that will allow citizens, businesses, government and other entities to make informed decisions concerning energy technologies and services.
- The proposal is counter to the objective that the public interest RD&D program is connected to the market.
- The proposal is counter to the energy policies of the State of California including, but not limited to, the policies for PIER and for energy in California as expressed in specified legislation and reports.



2005 PIER-EA EEGP: RD&D Committee Process

- Any proposal disapproved by the RD&D Committee will not affect the score of any other proposal.
- The RD&D Committee decides which ranked proposals to forward to the full Commission to consider for funding.
- The RD&D Committee reserves the right to skip over disapproved proposals and to recommend funding proposals ranked lower on the list.



2005 PIER-EA EEGP: CEC Business Meeting

- The final rank-ordered list and the recommendations from the RD&D Committee will be considered at a regularly scheduled business meeting
- The Commission, at the Business Meeting, reserves the right to reject any or all of these recommendations and to select any proposal from the final rank-ordered list.
- Any proposal rejected by the full Commission will not affect the score of any other proposal.



2005 PIER-EA EEGP: Unfunded Proposals

- **Following the Commission approval of project funding:**
 - Those applicants whose proposals were not funded will receive a letter from the Program Administration which describes the reason(s) for rejection - along with a status letter indicating if the proposal would be eligible for resubmission if there is another EEGP solicitation



2005 PIER-EA EEGP: Resubmitted Proposals

- Applicants resubmitting a proposal that was not funded in an earlier solicitation must satisfy the following requirements:
 - Receive a status letter that states that the proposal is eligible for resubmission
 - Comply with all new requirements specified in the current GAM
 - Provide a resubmission summary (5 pages max.) that identifies and responds to the concerns noted in the previous evaluation of the proposal
- Resubmission summaries failing to address all significant concerns will be sufficient grounds to fail initial screening



- **Applicants may obtain a debriefing regarding an unfunded proposal by:**
 - **Contacting the EEGP Administrator to discuss the proposal.**
 - **Submitting a written (letter or email) list of questions or issues within 30 days of receiving the status letter on the proposal in question. The EEGP Administrator will respond to written inquiries in writing (letter or email) within 30 days after the request has been made.**



2005 PIER-EA EEGP: Follow-On Funding

- EEGP: one-time funding source
- Successful projects may be eligible for follow-on awards in the PIER program, outside of the EEGP



2005 PIER-EA EEGP: Modifications

- To make a project acceptable, the Commission or EEGP Administrator retains the right to negotiate minor changes of a proposal's Project Narrative or budget at any time during the evaluation, approval, and agreement execution process. For example:
 - Adjust project scope to produce information needed
 - Adjust project budget to comply with expense guidelines
 - Avoid duplication of work
 - Reduce administrative requirements
 - Include tasks necessary for project success



2005 PIER-EA EEGP: Intellectual Property Rights

- Deliverables and reports specified for delivery become the property of the Commission.
- All data produced under the grant agreements are the property of the Awardee, subject to use rights by the Commission.
- Patent rights for any inventions are the property of the Awardee, subject to use rights by the Commission.
- The Awardee must disclose to the EEGP Administrator, on a confidential basis, all such inventions.
- The EEGP Administrator will ensure that all personnel who handle, screen or review proposals containing proprietary/confidential information keep this information confidential.



2005 PIER-EA EEGP: Proprietary Information

- If the proposal contains proprietary information, then the applicant must clearly mark those sections in the application.
- For electronic submissions, the footer of each proprietary page or section must contain the words “Contains proprietary information,” and the appropriate text should be highlighted.
- For hardcopy submissions, this could be in the form of a classification stamp at the top and bottom of classified pages or boxes placed around specific paragraphs or annotations in the margin that clearly identify those sections that are proprietary.
- Applicants are encouraged to limit the proprietary information to only that which is necessary to adequately assess the technical merits of the proposed concept. Classifying an entire proposal as proprietary is not acceptable.
- The EEGP Administrator will ensure that all personnel who handle, screen or review proposals containing proprietary/confidential information keep this information confidential.



2005 PIER-EA EEGP: Grant Application Process

- **Must follow checklist of items in order**
- **Electronic submissions preferred**
 - Cover email must come from an institutional representative who is authorized to contractually commit the submitting organization to performing the proposed work
 - Proposals must be submitted as 2 (or 3) file attachments
 - » (1) entire proposal; (2) project summary; and (3) budget in Excel template (optional)
 - If you have NOT received a confirmation from the EEGP Administrator, you must call to confirm that the application was received by the deadline



2005 PIER-EA EEGP: Grant Application Process Cont'd.

- **Hard copies allowed**
 - Original and 8 full single-sided copies
 - If you have NOT received a confirmation from the EEGP Administrator, you must call to confirm that the application was received by the deadline
- **Faxed copies not acceptable**
- **Proposals sent to the Commission will NOT be accepted**
- **Follow formatting requirements**



2005 PIER-EA EEGP: Grant Application Checklist

- Form A: Grant Application Cover Page
- Resubmission Summary (required for those resubmitting; 5 pages maximum, single-spaced)
- Project Summary (*2 pages max., single-spaced*)
- Project Narrative (*10 page max., single-spaced*)
- Appendices to Narrative (*optional - 10 page max., single-spaced.*)
- Form B: Certifications



2005 PIER-EA EEGP: Grant Application Checklist Cont'd.

- Form C: Proposed Budget Summary
- Form D: Project Personnel and Team Qualifications (*one page max.*)
- Key Personnel Résumés (Curriculum Vitae) (*Max. of two pages per person. Required for Principal Investigator, Project Manager, and other technical personnel critical to the project's success.*)
- Form E: Recommended Reviewers



2005 PIER-EA EEGP: Project Summary

- Two-page, non-proprietary summary description of the grant project
- Summarizes the key items requested in the recommended narrative format
- Non-proprietary version posted on the Commission web site at the onset of the project; final project summary posted at the end of the project



2005 PIER-EA EEGP: Project Narrative

- 10-page max.
- Appendices: 10-page max.
 - Forms A-E and resubmission summary are NOT counted as part of the Appendices to the project narrative
- Describes project plan in detail, using recommended outline



2005 PIER-EA EEGP: Project Narrative Outline

- Project Goal
- Project Objectives
- Impact on Environmental Problem/Benefit to California ratepayers and electric market
- Impact on Energy Problem/Benefit to California ratepayers and electric market
- State of the Science and Knowledge Gaps
- Scientific and/or Technical Issues and Barriers
- Primary Tasks and Deliverables



2005 PIER-EA EEGP: Project Goal

■ **Accurately and clearly identify:**

- The importance of your research as it relates to an important California public interest environmental issue related to the generation, transmission, distribution and use of electricity.
- The environmental problem that is being addressed and clearly demonstrate the electricity connection.
- The energy-related environmental public benefits that could be derived from proposed project



2005 PIER-EA EEGP: Project Objectives

- **Describe clear and measurable objectives that demonstrate how the project will:**
 - Support the early development of promising, new scientific concepts;
 - Lay the foundation for larger-scale research;
 - Be useful in determining the need for new PIER-EA planning efforts (roadmaps);
 - Improve understanding of key processes that affect environmental quality in California as a result of electricity generation, transmission, distribution, and/or use; and /or
 - Provide information in key areas necessary for more informed decision and policy making.



2005 PIER-EA EEGP: Impact on Environmental Problem

- Impact on **Environmental** Problem / Benefit to California:
 - Quantify the potential impact of the project on the environmental problem being addressed.
 - If unable to quantify, describe in qualitative terms the types of benefits for California that the project will produce for addressing the environmental problem targeted by this project.



2005 PIER-EA EEGP: Impact on Energy Problem

- Impact on **Energy** Problem / Benefit to California:
 - Where appropriate, quantify the potential impact to the electric consumer in terms of savings due to reduced cost per kWh, reduced kWh consumption, increased reliability, etc.
 - Where appropriate, quantify the potential benefit in terms of energy and cost savings to the state of California as a whole.



2005 PIER-EA EEGP :

State-of-the Science and Knowledge Gaps

- Summarize the relevant results of a current literature/Internet search. Point out where your work will extend the existing knowledge base.
- Compare existing processes, services, and/or products that perform the same or similar functions as the proposed concept. Clearly show the relevant differences (e.g., cost, reliability, efficiency, functions, etc.). We recommend that comparison data be placed in table format when practical.



2005 PIER-EA EEGP:

Scientific and/or Technical Issues & Barriers

- Identify the scientific and/or technical obstacles that this project seeks to overcome.



2005 PIER-EA EEGP: Primary Tasks and Deliverables

- Provide a description of the work that will be conducted to accomplish the primary tasks.
- Provide a description of key deliverables (e.g., quarterly reports, draft and final reports, draft and final two-page project summary).
- Indicate when deliverables will be submitted.



2005 PIER-EA EEGP: Grant Award Agreement

- **Once a grant has been approved for funding by the Commission:**

- Award notification letter is sent to applicant containing a list of any outstanding issues that need to be resolved prior to executing the agreement.

- **Once outstanding issues have been resolved:**

- Agreement is mailed to applicant.
- Agreement must be signed by both parties before work may begin or expenses reimbursed.



2005 PIER-EA EEGP: Sample Grant Agreement

■ Agreement is based on Sample Grant Agreement

- All applicants should review standard terms and conditions prior to submitting a proposal
- Identify those issues that need to be resolved in the event of an award
- Failure to agree to the terms, conditions, and requirements of the grant agreement are grounds to cancel the award



2005 PIER-EA EEGP: Grant Performance

■ Funds are distributed only for reimbursement of project expenses

- Invoices : submitted monthly or quarterly
- Payment can be withheld for the following reasons:
 - » Project reports are not current
 - » Progress reports contain insufficient detail to assess Awardee's progress
 - » Evidence of poor performance
 - » Billing is submitted for travel that does not meet requirements in GAM
- Last payment will be held and not paid until final deliverables are judged acceptable



2005 PIER-EA EEGP: Deliverables

- **Progress reports**
 - Quarterly
- **Draft and final report**
 - Final report will be posted on Commission web site
- **Draft and final project summary**
 - Final project summary likely to be posted on Commission web site and made available to the public



2005 PIER-EA EEGP: Recommended Reviewers

- **Purpose:** Identify potential qualified technical reviewers for proposals
- Do not recommend individuals that would have a conflict of interest in reviewing your proposal or would even give the appearance of a conflict of interest or bias
- EEGP Administrator retains the final authority to select the technical reviewers
- Email to EEGP Administrator
- OPTIONAL



2005 PIER-EA EEGP: Deadline



**Deadline for receipt of
applications:
5:00 PM (Pacific Time)
June 1, 2005**



2005 PIER-EA EEGP: Submissions and Contact Information

- ***Address for electronic submission
(PREFERRED): Explore2005@ucop.edu***

- **Mail:**
 - PIER-EA Exploratory Grant Program Administrator
 - California Institute for Energy and Environment
 - University of California, Office of the President
 - 1333 Broadway, Suite 240
 - Oakland, CA 94612-1918



2005 PIER-EA EEGP:

Submissions and Contact Information Cont'd.

- **EEGP Administrator Contacts:**
 - Administrative: Brad Niess - 510-287-3326
 - Technical: Edward Vine - 510-486-6047
- **Email: Explore2005@ucop.edu**
- **Proposals sent to the Commission will not be accepted.**
- **If you have NOT received a confirmation from the EEGP Administrator, you must call to confirm that the application was received by the deadline.**
 - If an applicant claims to have submitted a proposal, but no confirmation notice was sent by the EEGP Administrator, the proposal will not be accepted.



2005 PIER-EA EEGP: Additional Information

- If interested in receiving notifications of any late changes to the application process, send an email to Explore2005@ucop.edu and request your email address be added to the “Applicant Notification List.”
- Applicants must use the current version of the Grant Application Manual that is posted along with the solicitation on the Commission’s web site at www.energy.ca.gov/contracts where it is available for viewing and downloading in both PDF and Microsoft Word 97/98 format.



2005 PIER-EA EEGP: Schedule

- 
- Release and advertise RFP & GAM March 1
 - Workshops March & April
 - Grant Applications Due June 1
 - Proposal Screening Completed June 30
 - Technical Review Completed Aug. 12
 - Program Committee Review Completed Sep. 16
 - RD&D Committee Approval Oct. 14
 - Business Meeting Approval Dec. 8
 - DGS Approval Dec. 22
 - Notify Applicants Dec. 24
 - CIEE subaward agreement with Awardees Feb. 4, 2006



2005 PIER-EA EEGP: Workshop Schedule

- **University of California, Merced**
 - March 30 (10 AM - 12 PM)

- **University of California, Riverside**
 - April 5 (10 AM - 12 PM)

- **University of California, Davis**
 - April 7 (10 AM - 12 PM)



Past PIER-EA EEGP



2003 and 2004 EEGP Projects



PIER-EA EEGP: Fate of Proposals



	<u>2003</u>	<u>2004</u>
■ Proposals submitted	30	42
■ Proposals funded	10	6



2003 and 2004 PIER-EA EEGP: Submittals



2003 (#/%)

2004 (#/%)

■ Small Business	6/20%	8/19%
■ Large Business	3/10%	4/9%
■ Academic Institution	10/33%	14/33%
■ National Laboratory	6/20%	6/14%
■ Non-Profit	4/13%	9/21%
■ Individual	1/3%	1/2%



2003 and 2004 PIER-EA EEGP: Submittals



2003 (#/%)

2004 (#/%)

■ Indoor Air Quality	1/3%	6/14%
■ Outdoor Air Quality	6/20%	7/17%
■ Land Use & Habitat	5/17%	5/12%
■ Aquatic Resources	4/13%	5/12%
■ Global Climate Ch.	11/36%	11/26%
■ Other	3/10%	8/19%



2003 and 2004 PIER-EA EEGP: Submittal Highlights

- More proposals - 42 for 2004 EEGP versus 30 for 2003 EEGP
- Less proposals from national laboratories and more from non-profits. All the other categories remained virtually the same
- More Indoor Air Quality, less Global Climate Change (total percentage), and more Crosscutting (Other) proposals in 2004
- More proposals from outside California: 31% (13 out of 42). Proposals came from ten states the District of Columbia, and 2 Canadian provinces
- 10 proposals were resubmittals from 2003 EEGP



2003 and 2004 PIER-EA EEGP: Funded



2003 (#/%)

2004 (#/%)

■ Small Business	0/0%	0/0%
■ Large Business	1/10%	0/0%
■ Academic Institution	5/50%	3/66%
■ National Laboratory	2/20%	3/33%
■ Non-Profit	2/20%	0/0%
■ Individual	0/0%	0/0%



2003 and 2004 PIER-EA EEGP: Funded



2003 (#/%)

2004 (#/%)

■ Indoor Air Quality	0/0%	1/11%
■ Outdoor Air Quality	1/10%	1/22%
■ Land Use & Habitat	1/10%	0/0%
■ Aquatic Resources	3/30%	2/22%
■ Global Climate Ch.	5/50%	1/11%
■ Other	0/0%	1/33%



2003 and 2004 PIER-EA EEGP: Funded Highlights



- Funded more types of organizations in 2003 than in 2004
 - In 2004, funding academic institutions and national laboratories
- More diversity in subject areas for proposals in 2004
- 1 funded proposal from outside California: Tennessee
- 2 funded proposals were resubmittals from 2003 EEGP



2003 PIER-EA EEGP: Funded Proposals

1. **Elizabeth Strange - Stratus Consulting** - Research on Estimating the Environmental Benefits of Restoration to Mitigate or Avoid Environmental Impacts Caused by California Power Plant Cooling Water Intake Structures
2. **Dan Kammen - UC Berkeley** - The Environmental Impacts & Economic Potential of Novel Hydrogen-Renewable Infrastructure
3. **Ellen Cypher - CSU, Stanislaus** - Effect of Transmission Line Corridors on the Demography of the Endangered Plant Kern Mallow & on Plant Species Composition in the Lokern Area
4. **Rick Diamond - LBNL** - Is Efficiency Enough? Towards a New Framework for Carbon Savings in the California Residential Sector
5. **Ted Tsotsis - USC** - Novel Approaches for the Reclaim & Reuse of Boiler Blow-Down Streams
6. **Ernst Worrell - LBNL** - Optimization of Product Lifecycles to Reduce GHG Emissions
7. **Arpad Horvath - UC Berkeley** - Life-cycle Energy Assessment of Alternative Water Supply Systems in California
8. **Gary Wolff - The Pacific Institute** - Quantifying the Potential Air Quality Impacts From Electric Demand Embedded in Water Management Choices
9. **Marc Fischer - LBNL** - Planning Atmospheric Carbon Monitoring in California
10. **Jill Gravender - California Climate Action Registry** - Utility/Power Producer Specific GHG Reporting Protocol



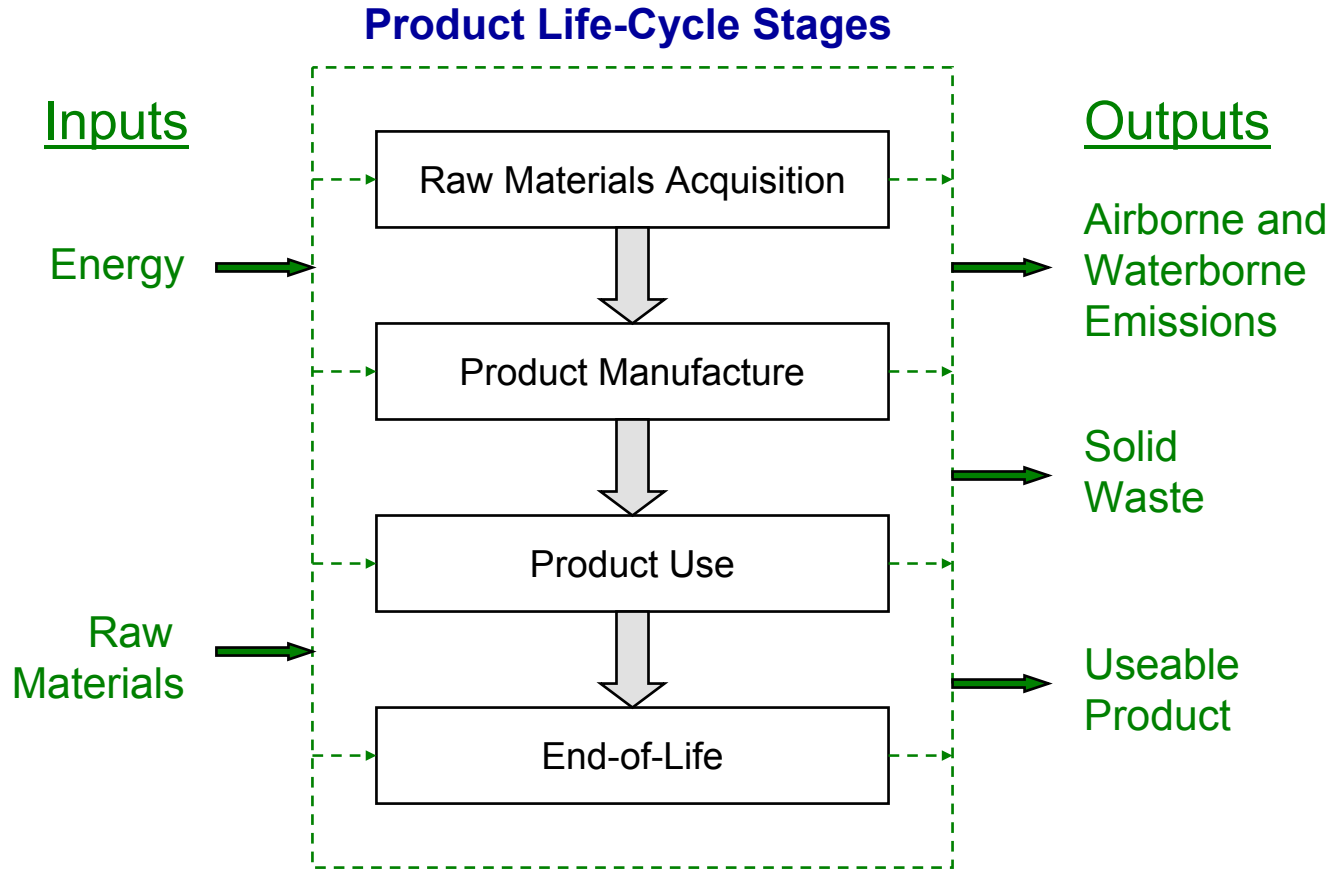
2003 PIER-EA EEGP: Worrell Project



Optimization of Product Life Cycles to Reduce Greenhouse Gas Emissions in California



Product Life-Cycle Optimization



Product Life-Cycle Assessment (LCA)

Project Objectives

- 1) Identify 50 products manufactured in California and estimate the associated life-cycle energy consumption and GHG emissions of these products
- 2) Select two products (cement/concrete and personal computers) for detailed LCA case studies to identify opportunities for life-cycle GHG emissions reductions in California
- 3) Identify potential policy options available to California for reducing the life-cycle GHG emissions of the two case study products



Project Status

- Project completed
- The Commission is planning to invite the researchers to present their results to an interagency climate change group
 - EEGP goal: provide information to decision makers
- Scoping in nature
 - Highlights opportunities for reducing GHG emissions and a methodology that can be refined and used in other case studies



2004 PIER-EA EEGP: Funded Proposals

1. **Ashok Gadgil - Lawrence Berkeley National Laboratory** - To Improve Prediction of Indoor Exposure to Outdoor Air Pollution in Apartment Buildings
2. **Susan Harrison - UC Davis** - Assessing Landscape Change over 70 years in the Sierra Nevada
3. **Henriette Jager - Oak Ridge National Laboratory** - Testing and Improvement of the ORCM Chinook Salmon Model
4. **Joseph Cech - UC Davis** - How Fish Sense the Presence of Fish Screens
5. **Josette Bellan - California Institute of Technology** - The Efficient Modeling of Chemical Reactions for Pollutant Predictions
6. **Tom McKone - Lawrence Berkeley National Laboratory** - Public Health Benefits of End-Use Electrical Energy Efficiency in California

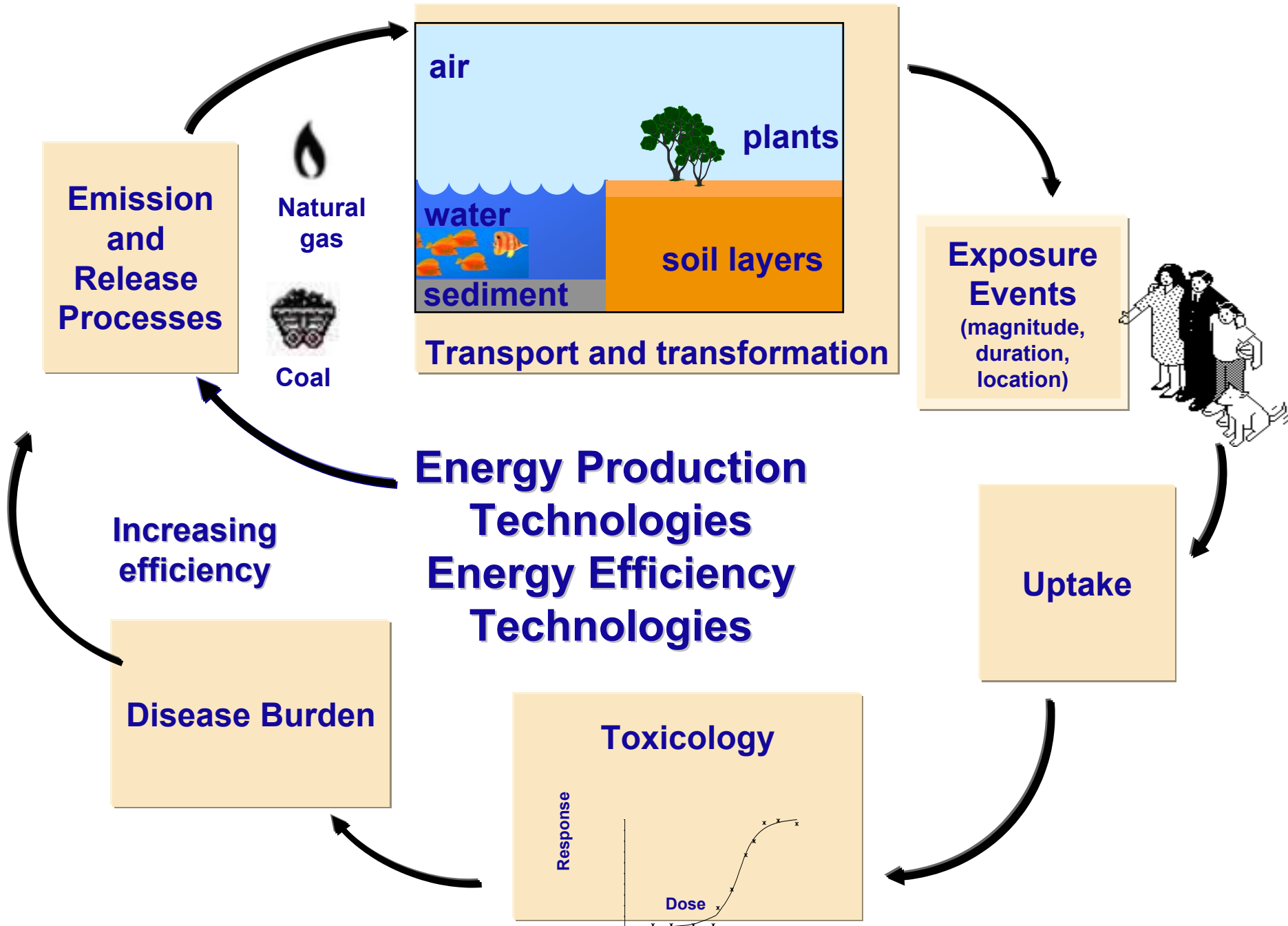


2003 PIER-EA EEGP: McKone Project



Public Health Benefits of End-Use Electrical Energy Efficiency in California





Project Objectives

- 1) Define a framework to facilitate the characterization of net health benefits of energy efficiency gains in California
- 2) Demonstrate the use of the EPA TRACI (Tool for the Reduction and Assessment of Chemical and other Environmental Impacts) system to facilitate this roadmap
- 3) Present a case study on this framework of health benefits attributable to increased use of insulation in existing California residences

